A METHOD OF TREATING COMPOUND FRACTURES.

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THE present paper deals with a method for treating compound fractures and with the results of that treatment as illustrated by the cases admitted into the author's wards at the London Hospital during the last six years.

The method aims at being simple, and in the following account it may be considered as applied to the commonest of compound fractures, viz.: those of the leg.

On admission, the limb is covered with lint soaked in carbolic lotion and is subsequently cleaned with the greatest care; protruding bone is replaced, loose or damaged bone is removed, and the broken ends are adjusted by means of splints with as little delay as possible.

1. Ordinary well-padded wooden splints are employed, but under no circumstances is the limb secured to the splint by means of strapping. Strapping may be used to form a stirrup whereby extension may be applied in fractures of the femur or humerus, but no form of plaster appears to be other than objectionable when the question of fixing the limb is concerned. If the strapping be adjusted with sufficient firmness, it will often be found that within twenty-four hours the limb has swollen and the strips of plaster are cutting into the soft parts and are impeding the circulation. The strapping then has to be cut or reapplied, and a second adjustment of the limb is rendered necessary. On the other hand, in process of time, the band of strapping is found to have come loose from shrinking of the limb, and a further readjustment of the fractured parts is called for. In the place of plaster, straps of fine webbing and buckles are made use of to secure

the limb to the splint. These vary in length, and are applicable to all parts. If found to be too tight or too loose they can be altered as often as necessary in the day without the least disturbance of the limb. In this way the limb can be secured with a proper degrees of firmness. Where the webbing crosses the shin or the dorsum of the foot a small shield made of gutta-percha, and lined with lint, is interposed.

When side splints are employed these also are held in place by straps and buckles.

No bandages are ever applied. They are quite unnecessary. They cannot be readily tightened or loosened, and they cover up to an undesirable extent the damaged parts.

2. In the second place the limb is kept throughout in the open air. This would happen by necessity, more or less, in the case of the upper limb, but it is insisted upon also in all fractures of the lower limb in which there is a wound. If the principles of aseptic surgery be well founded, a worse atmosphere with which to surround a wound could scarcely be found than that which exists under the bedclothes. This atmosphere is confined, is hot and moist, and when flatus is passed or the bed-pan is used must of necessity become especially offensive. In all compound fractures of the leg or thigh the limb is kept throughout entirely uncovered as well by night as by day and in the winter as in the summer. In cold weather the nurse makes a cotton wool cap for the foot, but during the six years in which this rule of uncovering the limb has been observed there have been no complaints of chill or of evils arising from exposure. It might be mentioned that in the author's wards in all cases of wound of the lower limb, including amputation wounds, and in all cases of ulcer, the part is kept throughout the whole period of treatment uncovered save by the necessary dressings, and that since this plan has seen adopted the results have been infinitely improved.

3. The third element in the treatment concerns the care of the wound. In cases of compound fracture there is usually a not inconsiderable amount of bleeding and an oozing from the wound which will often be continued for many days. It is very

desirable that this fluid should not be pent up in the limb, and that it should be allowed the freest possible means of escape. The plan of sealing the wound with collodion may be spoken of in general terms as bad. It can in no way control the oozing, which may long continue from the damaged parts, and merely confines within the recesses of the limb a fluid which is admirably adapted for the development of bacteria.

While a free exit should be given for all discharges of blood and serum such a barrier must, at the same time, be erected as will prevent the entrance of pus-producing bacteria. A dressing of antiseptic gauze wool may possibly meet these conditions, but in a large proportion of cases such a dressing needs to be very frequently changed, and such a change cannot always be effected without disturbing the position of the broken bones and putting the patient to no little inconvenience.

In the present collection of cases the wounds have been simply covered by a heap of dry antiseptic powder, which has been applied without stint. This covering of powder may be considered to seal the wound so far as the possible entrance of bacteria is concerned, while at the same time it in no way impedes the free escape of blood and serum from the damaged parts.

The discharge finding its way into the protecting powder forms with it a harmless scab or crust. As the powder becomes saturated more and more of it is applied, but the crust produced is not disturbed. In certain cases the oozing continues for many days, and in one or two instances the crust produced has exceeded the size of the adult fist. The powder employed has been iodoform or creolin. The latter has been found to be the more convenient. For the first few days the powder may need to be dusted on every few hours, and as the limb is kept always uncovered the saturation of the crust can be at once noticed. When no more blood is found to be escaping the powder is discontinued, and some seven days after this period the artificial scab is removed and the wound beneath may be expected to be healed or to be healing.

When the laceration occurs upon the upper surface of the limb there is no difficulty in covering it with powder. When it

is placed upon the sides of the extremity a platform of cotton wool must be so fixed in place that the powder when dusted upon it will bury the wound. The cotton wool may be kept in position by fixing it against the side splints, or by attaching it to the skin by gum.

The following advantages may be claimed for this method. It is simple and requires but the simplest appliances. The fracture when once adjusted need not be again disturbed. The damaged part is kept exposed to view, and the position of the ends of the bone can be ascertained at any moment. It may be claimed that the results, as shown in the subjoined table, are satisfactory.

The materials from which this table has been compiled have been collected by Mr. Y. Mills, the surgical registrar at the London Hospital.

The list deals with all those cases of compound fracture admitted into the author's wards during the last six years, which were treated in the manner above described.

The record commences in the year 1886.

From the table are excluded the following cases: Compound fractures of the skull; compound fractures of the limbs treated by primary amputation or by irrigation; compound fractures which had been under treatment before admission to the hospital, and in which suppuration had taken place before the patients came under notice.

Certain severe cases of extensive fracture in which death ensued within a few hours of admission, and before any definite treatment could be carried out, are also excluded.

There were sixty-one cases treated in the manner described. In forty-nine of these (eighty per cent.) the wounds healed without suppuration, and with a normal range of temperature. In seven cases suppuration took place, and after a more or less prolonged treatment the patient recovered and the bones united. In the remaining five instances a secondary amputation was carried out. Among the sixty-one cases there was one death.

SIXTY CASES OF COMPOUND FRACTURE.

Primary healing,	49	cases
Suppuration,	7	"
Secondary amputation	5	"
	61	" one death.

The following is an analysis of the forty-nine cases in which healing took place without suppuration. It will be seen that forty of the patients were males and nine females; that the greater number were between the ages of twenty and sixty, and that more than one-half of the total number of cases were fractures of the tibia and fibula. There was one compound fracture of the femur.

FORTY-NINE CASES OF UNION WITHOUT SUPPURATION.

SEX.		AGE.					LOWER LIMB.					UPPER LIMB.							
Male.	Female.	Under 10.	10 to 20.	20 to 40.	40 to 60.	Over 60.	Femur.	Tibia.	Fibula.	Tibia and Fibula.	Foot.	Clavicle.	Humerus.	Radius.	Ulna.	Radius and Ulna.	Hand.	Scapula.
40	9	0	10	16	20	3	1	3	2	28	1	1	6	0	0	4	3	0

In these cases, as above stated, there was a normal range of temperature. In certain of the examples there was a rise above normal during the first twenty-four or forty-eight hours; a rise of temperature which is still, for want of a better term, referred to "traumatic fever." After this reaction had passed off the temperature remained in each instance normal. As a single exception must be mentioned the fatal case quoted below.

In many of these examples it is needless to say that the skin wound was small. In the smaller proportion of cases the laceration was considerable. The following selection of instances will illustrate the severer class of fracture.

M., 50. Fall from height. Compound fracture of tibia and fibula. Bones laid bare to the extent of two and one-half inches. Dislocated shoulder.

M., 54. Patient subject of alcoholism. Compound fracture of tibia and fibula. Two wounds in the skin. Both bones exposed.

M., 14. Railway accident. Compound fracture of tibia and fibula. Extensive laceration. Sutures inserted.

F., 40. Accident during outburst of insanity. Compound fracture of both legs. Patient difficult to restrain.

F., 56. Ridden over by cab. Compound fracture of lower end of humerus. Two wounds. Largest three-quarters of an inch in length.

In three instances projecting portions of bone were sawn or chipped off. In four cases an attack of delirium tremens followed the accident.

The single fatal case comes among this list of those in whom primary healing occurred. The patient was a man aged sixty-nine. He had been ridden over by a cart, and had a compound fracture of the leg. The bones were much displaced, but the wound was small. It healed without a sign of suppuration. The patient was a drunkard. He soon became delirious and, sinking into a typhoid state, died of hypostatic pneumonia on the twenty-eighth day.

In the seven examples in which suppuration took place, all the patients were males and their ages ranged from fifteen to forty-five. The fractures were in every instance the result of direct violence. The bones broken were in two cases the tibia and fibula, in four cases the tibia alone, and in one example the radius and ulna.

One patient is spoken of as a drunkard, but the others appeared to have been in sound health. In two cases bone was removed before the dressing was applied. In both these instances and in one other necrosis followed.

In one case erysipelas supervened on the tenth day and in another case at a later period. The length of time which elapsed between the accident and recovery ranged from fifty-three to one hundred days.

In the five cases of amputation the fracture was treated on admission by the method already described. In due course sloughing and suppuration took place, and the damaged limb was removed. All the patients recovered.

In one case, a man aged 32, the right foot was crushed.

The patient developed delirium tremens and was found to have albuminuria. The foot was amputated on the sixth day. In the other instances the amputation was at a later periods, respectively on the twenty-second, fiftieth, sixty-second and sixty-ninth days. The youngest patient was 12, the oldest 63. One was a Pott's fracture, two involved the tibia alone and one the humerus. In all suppuration took place, drains were inserted and free incisions made, and the limb was treated by liberal irrigation.

This series of cases serves to illustrate incidentally the gravity of compound fractures of the tibia alone. Nine examples of this injury are included. In three union took place without suppuration; in six, severe suppuration followed, and in two of these instances the limb was ultimately amputated.

Such cases of compound fracture as were not treated by the method described in this paper, and were, on the other hand, not considered to be demanding amputation, were treated by copious irrigation.

By means of a special tank apparatus, permanently erected in the ward, a stream of cold or warm water, running at the rate of thirty gallons an hour, could be passed over and through the damaged part.

With this measure some very satisfactory results have been obtained.